REMARKS

In view of the foregoing amendments and following remarks responsive to the second Office Action in this application, dated January 30, 2004, Applicant respectfully requests favorable reconsideration of this application.

In Section 1 of the Office Action, the Office purports to maintain one particular objection to the drawings asserted in the previous Office Action. Specifically, the Office asserted that reference numeral 200 in the drawings is still missing from the specification.

Applicant respectfully traverses. There appears to be a misunderstanding, possibly due to Applicant's clerical error in responding to the previous Office Action. Particularly, in the Remarks section, Applicant indicated that it had amended the specification to add mention of reference numerals 200, 300, 400, 500, 600, 700, 800, 825 and 900. That statement contained a typographical error. Specifically, the drawings did not contain a reference numeral 200 and, hence, Applicant did not add mention of reference numeral 200 in the specification. Accordingly, the objection set forth in Section 1 of the present Office Action is moot. Reference numeral 200 does not (and never did) appear in the drawings or the specification.

In Section 2 of the Office Action, the Office noted that, contrary to the Applicant's remarks in response to the previous Office Action, the amended claim did not reflect that claim 32 had been amended to depend from claim 31, rather than claim 21.

Accordingly, Applicant herein submits an amended claim 32, which now correctly depends from claim 31, rather than claim 21.

Generally speaking, all of the claims have been rejected based on prior art grounds largely identical to the ground asserted in the First Office Action. In this second Office Action, the Office has clarified a clerical source of confusion that existed in the first Office Action, namely, the identity of the "Matthews" reference referred to in the first Office Action. Particularly, the Office has now clarified that the "Matthews" reference is U.S. Patent No. 6,084,858.

In addition, the Office has addressed at least some of the arguments against the prior art objections that Applicant asserted in its response to the first Office Action.

Of greatest significance are sections 5 and 7 of the second Office Action, in which the Office addressed Applicant's arguments contained in Applicant's previous amendment. Particularly, Applicant had argued that the Office's primary reference,

Berger, was inapposite to instant claims 1, 17 and 29 because Berger has nothing to do with dynamically resizing virtual pipelines or protecting network performance criteria since Berger relates to a one-time determination of the initial network bandwidth allocation as the network is being designed.

In Sections 5 and 7 of the Office Action, the Office took issue with this argument and argued that Berger does disclose dynamic resizing of pipelines during network operation. Particularly, the Office asserted:

> Berger specifically discloses using the connection in conjunction with the connection admission control (CAC) where the CAC is used to determine the maximum number of admissible connections (pipeline size). As such, Berger resizes the virtual pipelines to ensure there is no congestion in addition to allocating bandwidth when the network is being designed. As such, Examiner retains the rejection of claims 1, 17, and 29. Examiner has added further citations within the objection to more clearly indicate the teachings of Berger.

Those additional citations appear in section 7 of the second Office Action. Particularly, the Office asserted:

> Berger discloses making measurements during the operation of the network (Berger: col. 7, lines 8-20; col. 11, lines 36-47; and col. 12, lines 66-col. 13, line 12). Examiner has added further cited passages in order to offer passages that more clearly disclosed that measurements were taken during operation of the network.

Applicant respectfully traverses the rejections of independent claims 1, 17, and 29 and fully stands by and reasserts its previous argument that Berger is inapposite to the claims of the present application because it pertains to pre-operation design of the network, and does not concern dynamically resizing pipelines responsive to congestion in the network.

First, let us consider the section cited by the Office in order. Column 7, lines 8 through 21 of Berger are reproduced below.

> The present invention also <u>assumes</u> that the network 300 is heavily loaded because, for dimensioning, the relevant case is when network resources, as opposed to end-system resources, are the limiting factor for the throughout obtained for elastic-data connections. A network design <u>that assumes</u> well-performing closed-loop controls is complementary to control implementations that make good use of the deployed bandwidth. The closed-loop feedback controls of both TCP and ABR tend to seek out and fill up available bandwidth. At heavily loaded links, closed-loop feedback

> control of a connection attempts to keep at least one packet queued for transmission on the link when the control is properly designed and functioning. Otherwise, the control is needlessly limiting the throughput.

This paragraph actually supports Applicant's position, rather than the Office's. Particularly, the first sentence expressly states that the invention "assumes that the network 300 is heavily loaded . . .". As Applicant has previously argued, the invention is making assumptions about network traffic, it is not measuring it for purposes of resizing the pipeline. The remainder of the paragraph is simply a general discussion of TCP and ABR and essentially does not address what is or is not the invention. It is only the first sentence that addresses the invention and it expressly notes that the invention makes assumptions, and does not make measurements.

Turning to column 11, lines 36-47, it states:

> A connection (a source) is characterized by two parameters: (1) the mean time in seconds between completion of transmission of a file and the start of the transmission of the next file, denoted λ^{-1}, and (2) the mean size of a file in bits, denoted f. λ^{-2}, is the mean service time in the IS node (the mean think time). Moreover, for the dimensioning and CAC methods, only the product λf is pertinent. This product is the parameter u above and is the throughput of the source given that the network is imposing no restriction on this flow. Given the mean file size and the capacity of the link, B, then the mean service time of a job in the PS node, assuming no other jobs present, is f/B and is noted μ.

This paragraph does not seem pertinent. Applicant is not sure what the Office sees in this paragraph. This is a general discussion of parameters and does not appear to be saying what the invention does or does not do with these parameters.

Finally, turning to column 12, lines 66 through column 13, line 12, it states:

> From measurements on existing networks and using the CQN model, one can estimate the value of λf, which equals an estimate of u. In particular, for p>1, the asymptotic approximation for the mean number of active connections is:
> $E[Q_1]=N(l\text{-}p\text{-}^1)=N-B\lambda f$
>
> From measurements at a network node, say the network node at Chicago in Fig. 3, and the packet flows exiting the node on a given link, say the link between Chicago and New York, 302, one can estimate the average number of active connections, $E[Q_1]$, as well as the number of potential connections sharing the link, N. Then, from Eq. (14), one can determine λf and thus u.

Once again, this portion of Berger does not support the Office's position, but actually supports Applicant's position. Particularly, it refers to "measurements on existing networks". Further, it refers to estimates, not measurements.

Accordingly, the sections cited by the Office as supporting the position that Berger's invention pertains to real-time measurements of congestion and then adaptation of pipeline sizes in response thereto is not supported by the cited sections of Berger.

More significantly, there are many other sections of Berger that clearly establish that Berger is discussing pre-operation design of the network and that, during network operation, Berger provides no pipeline resizing, but instead employs connection admission measures (presumably including techniques such as call blocking) to address congestion.

However, even further, there are many other sections of Berger which make it much clearer that Berger does not pertain to real time measurement of congestion or resizing of pipelines based on those measurements.

Rather, the portions of Berger cited by the Office relate to a one-time determination of the initial network bandwidth allocation as the network is being designed. Thus, all of Berger's calculations are based on assumptions as to expected network traffic, not measured network traffic. See, for instance, col. 6, lines 16-25:

> An overall candidate network topology is analyzed based on a forecasted point-to-point traffic demand that is to be routed across the network. The traffic demand is defined in terms of the number of simultaneous flows of connections that are to be supported in a given load-set period so the number of concurrent flows/connections that are to be supported on each link of the network can be determined. The technique of the present invention focuses on a single link in a network and assumes that all of the flows/connections traversing the link are bottlenecked at the link.

Note that this portion of Berger speaks of "forecasted" traffic and "assumes" that there is a bottleneck. Further, traffic demand is defined in terms of the number of channels that "are to be" supported (using the future tense because the invention pertains to the pre-operation design of the system).

See also the following sections of Berger:

> The present invention also assumes the network 300 is heavily loaded because, for dimensioning, the relevant case is when network resources, as opposed to end-system resources, are the limiting factor for the throughput obtained for elastic/data connection. (Col. 7, lines 8-12).
>
> According to the present invention, the link bandwidth is sized, or dimensioned, based on a forecast of a number of connections that could be present simultaneously on the link during a busy period. The number of connections is referred to as N. For example, in Fig. 3, the link 302 between Chicago and New York should have the capacity to support N=1,000 connections simultaneously. (Col. 7, lines 22-28).
>
> Expected realistic values of the input parameters satisfy this check, though one can conceive of values that do not, in which case the method does not pertain, 412. Given that the input parameters appropriate the bandwidth is dimensioned according to an equation (5), 414. (Col. 9, lines 15-20).

In addition, note that, near the end of the Summary of the Invention section after the technique for determining link bandwidth is described, Berger says:

> Once the network has been dimensioned and is in service then for either the mean-based performance criterion or the tail-based performance criterion, the method of the present invention can include the steps of determining a maximum number of connections N* allowed on the link based on the link bandwidth B, and controlling connection admission to the link based on the determined maximum number of connections N*. Herein the term "connection admission control" is the policy used to decide whether a connection can be added to a link and still satisfy the performance objective, and regardless of the method used to establish the connection, such as signaling protocols or management procedures. (Col. 3, line 66- col. 4, line 11).

Note that the first sentence expressly states that the network is dimensioned before it goes into service. Also note that the congestion control mechanisms employed when the network is in service comprise "controlling connection admission", not resizing the links.

Even further, in the Background section, at column 1, lines 53-58, Berger states:

> In designing a high speed network, an important step is the dimensioning or capacity assignment of each link within the network. The dimensioning step typically occurs once the location of the nodes (e.g., the city in which a particular node will reside) and the connectivity between nodes (e.g., which nodes will be interconnected) is determined.

This paragraph expressly notes that dimensioning occurs after the location of the nodes and the conductivity between nodes is determined. There would be no need to provide

such an explanation if Berger was discussing network operation. Berger, instead, clearly is discussing network physical design.

Finally, column 9, lines 32-45 of Berger state:

> <u>After the network 300 has been dimensioned and placed into service</u>, a network operator may exercise no connection flow admission control (CAC), as is the case in the present best-effort-service IP-based networks. In such a situation, the performance objectives of Eqs. (1) and (2) should be viewed as design objectives, and the network operator could advertise that the network 300 has been designed based on such objectives. <u>The realized traffic will, however, differ from the forecast</u>, so it would be imprudent for the network operator to offer a per-connection service commitment to individual users. <u>If such a service commitment is desired the network operator would likely exercise a CAC policy on the realized traffic</u>.

Note that the first sentence clearly indicates that the discussion in the specification is only at this point turning to operation of the network after it is placed in service. All of the preceding discussion pertained to pre-operation design of the network. Further, note that the second sentence discusses what the network operator might advertise that the network is <u>designed</u> to do. Also note that the third sentence indicates that the <u>realized</u> traffic will differ from the <u>forecast</u> traffic so that it would be imprudent for the network operator to offer a per-connection service commitment to users.

In Berger, congestion control is handled during operation of the network by call admission control, not by resizing of virtual pipelines and that all of the discussion of the sizing the links pertains to the physical design and construction of the network, not dynamic adjustment of the virtual pipelines

Accordingly, contrary to the Office's assertions, Berger does not teach the elements of "(1) identifying the first set of virtual pipelines for which traffic exceeds a predetermined threshold", "(2) for each virtual pipeline in said set, determining the pipeline size that would cause said traffic through said pipeline to not exceed such predetermined threshold", and "(3) for each pipeline in said set that can be increased in size, increasing its size to said size determined in step (2)" recited in claim 1.

These are essentially all of the limitations of claim 1. Accordingly, claim 1 clearly distinguishes over Berger.

Independent claims 17 and 29 contain essentially the same limitations as claim 1 and, therefore, distinguish over Berger for the same reasons.

All other claims in the present application depend from one of the aforementioned independent claims 1, 17, and 29. Therefore, all claims distinguish over the prior art of record for at least the same reasons.

In addition, at least some of the dependent claims add even further distinguishing features over the prior art of record. For instance, with respect to claims 4, 20, and 35, the Office relies on admissions as to the content of the prior art allegedly made by Applicant on page 20, line 6 through page 22, line 17 of the application.

Applicant had argued against this rejection in response to the previous Office Action, noting that the only admission contained on pages 20-22 is that the Erlang blocking formula is known (which does not pertain to the subject matter of claims 4, 20, and 35). In response to this argument, the Office asserted in Section 6 of the second Office Action, that Applicant also discloses that the Erlang formula can be applied with a non-stationary offered load for a non-stationary system. In this package, Applicant discloses that two non-stationary equations may be used where "equation 2a is usually referred to as a point-wise stationery approximation (PSA), while equation 2b is referred to as a modified offered load (MOL) approximation". The Office asserted that, by using language such as "usually referred to", Applicant specifically disclosed that the equations are well known in the art and, as such, the mathematical relationships between the equations would also be known in the art.

Applicant respectfully traverses. The Office is not focusing on the proper inquiry. It is not necessarily the equations themselves that need to be novel. Rather, it is the decision to use the first equation when call rate has been increasing and to use the second equation when call rate has been decreasing. Quite simply, the Office cannot reject this claim as obvious without presenting evidence that it is known to use the first equation in the first situation and the second equation in the second situation. The Office has not cited any prior art to that effect. Accordingly, claims 4, 20 and 35, in fact, do further distinguish over the prior art of record.

Conclusion

In view of the foregoing amendments and remarks, this application is now in condition for allowance. Applicant respectfully requests the Examiner to issue a Notice of Allowance at the earliest possible date. The Examiner is invited to contact Applicant's

undersigned counsel by telephone call in order to further the prosecution of this case in any way.

Respectfully submitted,

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